

**ANNOTATED PAGES -USSN 09/113,071**

Camera System with Computer Language Interpreter

**STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT**

Not Applicable

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***Move from page 514-515 "CROSS REFERENCES TO RELATED APPLICATIONS" also tables (now converted to a list) on pages 514 to 515 and 545-551***

Field of Invention

The present invention relates to an data processing method and apparatus and, in particular, discloses a Camera System with Language Interpreter.

The present invention further relates to a camera having an one board interpreter for the interpreting of a programming language to manipulate and subsequently print out an image.

Background of the Invention

Recently, digital camera technology has become increasingly popular. In this form of technology, an image is normally imaged by CCD array. Subsequently, the images are stored on the camera on storage media such as a semiconductor memory array. At a later stage, the images are downloaded from the CCD camera device to a computer or the like where upon they go subsequent manipulation and printing in the course of requirements. The printing normally includes various image processing steps to enhance certain aspects of the image.

For details on the operation of CCD devices and cameras, reference is made to a standard text in this field such as "CCD arrays, cameras and displays" by Gerald C Holst, published 1996 by SPIE Optical Engineering Press Bellingham, Washington, USA.

Recently, there has been proposed by the present applicant, a camera system having a integral inbuilt printer that is able to produce full colour, high quality output images. Further, it is known to apply a filter to a digital image to produce various effects. The number of filters able to be utilized being totally arbitrary with the expectation that further filters will be discovered or created in future.

Unfortunately, changing digital imaging technologies and changing filter technologies result in onerous system requirements in that cameras produced today obviously are

ART32US

Turning now to Fig. 2, there is illustrated a schematic view of the internal hardware of the camera unit 1. The internal hardware is based around an Artcam central processor unit (ACP) 31.

#### Artcam Central Processor 31

The Artcam central processor 31 provides many functions which form the 'heart' of the system. The ACP 31 is preferably implemented as a complex, high speed, CMOS system on-a-chip. Utilising standard cell design with some full custom regions is recommended. Fabrication on a 0.25~~µ~~<sup>micron</sup> CMOS process will provide the density and speed required, along with a reasonably small die area.

The functions provided by the ACP 31 include:

1. Control and digitization of the area image sensor 2.

A 3D stereoscopic version of the ACP requires two area image sensor interfaces with a second optional image sensor 4 being provided for stereoscopic effects.

2. Area image sensor compensation, reformatting, and image enhancement.

3. Memory interface and management to a memory store 33.

4. Interface, control, and analog to digital conversion of an Artcard reader linear image sensor 34 which is provided for the reading of data from the Artcards 9.

5. Extraction of the raw Artcard data from the digitized and encoded Artcard image.

6. Reed-Solomon error detection and correction of the Artcard encoded data. The encoded surface of the Artcard 9 includes information on how to process an image to produce the effects displayed on the image distorted surface of the Artcard 9. This information is in the form of a script, hereinafter known as a "Vark script". The Vark script is utilised by an interpreter running within the ACP 31 to produce the desired

### Ink Jet Technologies

The embodiments of the invention use an ink jet printer type device. Of course many different devices could be used. However presently popular ink jet printing technologies are unlikely to be suitable.

The most significant problem with thermal ink jet is power consumption. This is approximately 100 times that required for high speed, and stems from the energy-inefficient means of drop ejection. This involves the rapid boiling of water to produce a vapor bubble which expels the ink. Water has a very high heat capacity, and must be superheated in thermal ink jet applications. This leads to an efficiency of around 0.02%, from electricity input to drop momentum (and increased surface area) out.

The most significant problem with piezoelectric ink jet is size and cost. Piezoelectric crystals have a very small deflection at reasonable drive voltages, and therefore require a large area for each nozzle. Also, each piezoelectric actuator must be connected to its drive circuit on a separate substrate. This is not a significant problem at the current limit of around 300 nozzles per print head, but is a major impediment to the fabrication of ~~pagewide~~ pagewidth print heads with 19,200 nozzles.

Ideally, the ink jet technologies used meet the stringent requirements of in-camera digital color printing and other high quality, high speed, low cost printing applications. To meet the requirements of digital photography, new ink jet technologies have been created. The target features include:

- low power (less than 10 Watts)
- high resolution capability (1,600 dpi or more)
- photographic quality output
- low manufacturing cost
- small size (pagewidth times minimum cross section)
- high speed (< 2 seconds per page).

All of these features can be met or exceeded by the ink jet systems described below with differing levels of difficulty. 45 Forty-five different ink jet technologies have been developed by the

Assignee to give a wide range of choices for high volume manufacture. These technologies form part of separate applications assigned to the present Assignee as set out in the ~~table below~~ list under the heading CROSS REFERENCES TO RELATED APPLICATIONS.

The ink jet designs shown here are suitable for a wide range of digital printing systems, from battery powered one-time use digital cameras, through to desktop and network printers, and through to commercial printing systems

For ease of manufacture using standard process equipment, the print head is designed to be a monolithic 0.5 micron CMOS chip with MEMS post processing. For color photographic applications, the print head is 100 mm long, with a width which depends upon the ink jet type. The smallest print head designed is IJ38, which is 0.35 mm wide, giving a chip area of 35 square mm. The print heads each contain 19,200 nozzles plus data and control circuitry.

Ink is supplied to the back of the print head by injection molded plastic ink channels. The molding requires 50 micron features, which can be created using a lithographically micromachined insert in a standard injection molding tool. Ink flows through holes etched through the wafer to the nozzle chambers fabricated on the front surface of the wafer. The print head is connected to the camera circuitry by tape automated bonding.

Cross-Referenced Cross References to Related Applications

~~The following table is a guide to cross-referenced patent applications filed concurrently herewith and discussed hereinafter with the reference being utilized in subsequent tables when referring to a particular case. The following co-pending US patent applications, identified by their US patent application serial numbers (USSN), were filed simultaneously to the present application on July 10, 1998, and are hereby incorporated by cross-reference.~~

USSN	Docket No.	[Reference]	Title
09/112,751	IJ01US	[IJ01]	Radiant Plunger Electromagnetic Ink Jet Printer
09/112,787	IJ02US	[IJ02]	Electrostatic Ink Jet Printer
09/112,802	IJ03US	[IJ03]	Planar Thermoelastic Bend Actuator Ink Jet
09/112,803	IJ04US	[IJ04]	Stacked Electrostatic Ink Jet Printer
09/113,097	IJ05US	[IJ05]	Reverse Spring Lever Ink Jet Printer
09/113,099	IJ06US	[IJ06]	Paddle Type Ink Jet Printer
09/113,084	IJ07US	[IJ07]	Permanent Magnet Electromagnetic Ink Jet Printer
09/113,066	IJ08US	[IJ08]	Planar Swing Grill Electromagnetic Ink Jet Printer
09/112,778	IJ09US	[IJ09]	Pump Action Refill Ink Jet Printer
09/112,779	IJ10US	[IJ10]	Pulsed Magnetic Field Ink Jet Printer
09/113,077	IJ11US	[IJ11]	Two Plate Reverse Firing Electromagnetic Ink Jet Printer

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09/113,061	H12US	[H12]	Linear Stepper Actuator Ink Jet Printer
09/112,818	H13US	[H13]	Gear Driven Shutter Ink Jet Printer
09/112,816	H14US	[H14]	Tapered Magnetic Pole Electromagnetic Ink Jet Printer
09/112,772	H15US	[H15]	Linear Spring Electromagnetic Grill Ink Jet Printer
09/112,819	H16US	[H16]	Lorenz Diaphragm Electromagnetic Ink Jet Printer
09/112,815	H17US	[H17]	Ptfe Surface Shooting Shuttered Oscillating Pressure Ink Jet Printer
09/113,096	H18US	[H18]	Buckle Grip Oscillating Pressure Ink Jet Printer
09/113,068	H19US	[H19]	Shutter Based Ink Jet Printer
09/113,095	H20US	[H20]	Curling Calyx Thermoelastic Ink Jet Printer
09/112,808	H21US	[H21]	Thermal Actuated Ink Jet Printer
09/112,809	H22US	[H22]	Iris Motion Ink Jet Printer
09/112,780	H23US	[H23]	Direct Firing Thermal Bend Actuator Ink Jet Printer
09/113,083	H24US	[H24]	Conductive Ptfe PTFE Ben Activator Vented Ink Jet Printer
09/113,121	H25US	[H25]	Magnetostriuctive Ink Jet Printer
09/113,122	H26US	[H26]	Shape Memory Alloy Ink Jet Printer
09/112,793	H27US	[H27]	Buckle Plate Ink Jet Printer
09/112,794	H28US	[H28]	Thermal Elastic Rotary Impeller Ink Jet Printer
09/113,128	H29US	[H29]	Thermoelastic Bend Actuator Ink Jet Printer
09/113,127	H30US	[H30]	Thermoelastic Bend Actuator Using PTFE And Corrugated Copper Ink Jet Printer
09/112,756	H31US	[H31]	Bend Actuator Direct Ink Supply Ink Jet Printer
09/112,755	H32US	[H32]	A High Young's Modulus Thermoelastic Ink Jet Printer
09/112,754	H33US	[H33]	Thermally Actuated Slotted Chamber Wall Ink Jet Printer
09/112,811	H34US	[H34]	Ink Jet Printer having a Thermal Actuator Comprising an External Coiled Spring
09/112,812	H35US	[H35]	Trough Container Ink Jet Printer
09/112,813	H36US	[H36]	Dual Chamber Single Vertical Actuator Ink Jet
09/112,814	H37US	[H37]	Dual Nozzle Single Horizontal Fulcrum Actuator Ink Jet
09/112,764	H38US	[H38]	Dual Nozzle Single Horizontal Actuator Ink Jet
09/112,765	H39US	[H39]	A Single Bend Actuator Cupped Paddle Ink Jet Printing Device
09/112,767	H40US	[H40]	A Thermally Actuated Ink Jet Printer having a Series Of Thermal Actuator Units
09/112,768	H41US	[H41]	A Thermally Actuated Ink Jet Printer Including a Tapered Heater Element
09/112,807	H42US	[H42]	Radial Back Curling Thermoelastic Ink Jet
09/112,806	H43US	[H43]	Inverted Radial Back Curling Thermoelastic Ink Jet
09/112,820	H44US	[H44]	Surface Bend Actuator Vented Ink Supply Ink Jet Printer
09/112,821	H45US	[H45]	Coil Acutuated Magnetic Plate Ink Jet Printer

#### Tables of Drop-on-Demand Inkjets

The present invention is useful in the field of digital printing, in particular, ink jet printing. A number of patent applications in this field were filed simultaneously and incorporated by cross reference.

Eleven important characteristics of the fundamental operation of individual ink jet nozzles have been identified. These characteristics are largely orthogonal, and so can be

elucidated as an eleven dimensional matrix. Most of the eleven axes of this matrix include entries developed by the present assignee.

The following tables form the axes of an eleven dimensional table of ink jet types.

- Actuator mechanism (18 types)
- Basic operation mode (7 types)
- Auxiliary mechanism (8 types)
- Actuator amplification or modification method (17 types)
- Actuator motion (19 types)
- Nozzle refill method (4 types)
- Method of restricting back-flow through inlet (10 types)
- Nozzle clearing method (9 types)
- Nozzle plate construction (9 types)
- Drop ejection direction (5 types)
- Ink type (7 types)

The complete eleven dimensional table represented by these axes contains 36.9 billion possible configurations of ink jet nozzle. While not all of the possible combinations result in a viable ink jet technology, many million configurations are viable. It is clearly impractical to elucidate all of the possible configurations. Instead, certain ink jet types have been investigated in detail. ~~These are designated IJ01 to IJ45~~ ~~above~~ Forty-five such ink jet types were filed simultaneously to the present application.

Other ink jet configurations can readily be derived from these ~~45~~ forty-five examples by substituting alternative configurations along one or more of the 11 axes. Most of the ~~IJ01 to IJ45~~ forty-five examples can be made into ink jet print heads with characteristics superior to any currently available ink jet technology.

Where there are prior art examples known to the inventor, one or more of these examples are listed in the examples column of the tables below. ~~The IJ01 to IJ45 series are also listed in the examples column.~~ The simultaneously filed patent applications by the present applicant are listed by USSN numbers. In some cases, a ~~printer~~ print technology may be listed more than once in a table, where it shares characteristics with more than one entry.

# **ACTUATOR MECHANISM (APPLIED ONLY TO SELECTED INK DROPS)**

Actuator Mechanism	Description	Advantages	Disadvantages	Examples
<b>Thermal bubble</b>	<p>An electrothermal heater heats the ink to above boiling point, transferring significant heat to the aqueous ink. A bubble nucleates and quickly forms, expelling the ink.</p> <p>The efficiency of the process is low, with typically less than 0.05% of the electrical energy being transformed into kinetic energy of the drop.</p>	<ul style="list-style-type: none"> <li>◆ Large force generated</li> <li>◆ Simple construction</li> <li>◆ No moving parts</li> <li>◆ Fast operation</li> <li>◆ Small chip area required for actuator</li> </ul>	<ul style="list-style-type: none"> <li>◆ High power</li> <li>◆ Ink carrier limited to water</li> <li>◆ Low efficiency</li> <li>◆ High temperatures required</li> <li>◆ High mechanical stress</li> <li>◆ Unusual materials required</li> <li>◆ Large drive transistors</li> <li>◆ Cavitation causes actuator failure</li> <li>◆ Kogation reduces bubble formation</li> <li>◆ Large print heads are difficult to fabricate</li> </ul>	<ul style="list-style-type: none"> <li>◆ Canon Bubblejet 1979</li> <li>◆ Endo et al GB patent 2,007,162</li> <li>◆ Xerox heater-in-pit 1990 Hawkins et al USP 4,899,181</li> <li>◆ Hewlett-Packard TIJ 1982 Vaught et al USP 4,490,728</li> </ul>
<b>Piezoelectric</b>	<p>A piezoelectric crystal such as lead lanthanum zirconate (PZT) is electrically activated, and either expands, shears, or bends to apply pressure to the ink, ejecting drops.</p>	<ul style="list-style-type: none"> <li>◆ Low power consumption</li> <li>◆ Many ink types can be used</li> <li>◆ Fast operation</li> <li>◆ High efficiency</li> </ul>	<ul style="list-style-type: none"> <li>◆ Very large area required for actuator</li> <li>◆ Difficult to integrate with electronics</li> <li>◆ High voltage drive transistors required</li> <li>◆ Full pagewidth print heads impractical due to actuator size</li> <li>◆ Requires electrical poling in high field strengths during manufacture</li> </ul>	<ul style="list-style-type: none"> <li>◆ Kyser et al USP 3,946,398</li> <li>◆ Zoltan USP 3,683,212</li> <li>◆ 1973 Stemme USP 3,747,120</li> <li>◆ Epson Stylus</li> <li>◆ Tektronix</li> <li>◆ 09/112,803</li> </ul>

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Ink Jet Printing

A large number of new forms of ink jet printers have been developed to facilitate alternative ink jet technologies for the image processing and data distribution system. Various combinations of ink jet devices can be included in printer devices incorporated as part of the present invention. Australian Provisional Patent Applications relating to these ink jets which are specifically incorporated by cross reference include:

Australian Provisional Number	Filing Date	Title
PO8066	15-Jul-97	Image Creation Method and Apparatus (IJ01)
PO8072	15-Jul-97	Image Creation Method and Apparatus (IJ02)
PO8040	15-Jul-97	Image Creation Method and Apparatus (IJ03)
PO8071	15-Jul-97	Image Creation Method and Apparatus (IJ04)
PO8047	15-Jul-97	Image Creation Method and Apparatus (IJ05)
PO8035	15-Jul-97	Image Creation Method and Apparatus (IJ06)
PO8044	15-Jul-97	Image Creation Method and Apparatus (IJ07)
PO8063	15-Jul-97	Image Creation Method and Apparatus (IJ08)
PO8057	15-Jul-97	Image Creation Method and Apparatus (IJ09)
PO8056	15-Jul-97	Image Creation Method and Apparatus (IJ10)
PO8069	15-Jul-97	Image Creation Method and Apparatus (IJ11)
PO8049	15-Jul-97	Image Creation Method and Apparatus (IJ12)
PO8036	15-Jul-97	Image Creation Method and Apparatus (IJ13)
PO8048	15-Jul-97	Image Creation Method and Apparatus (IJ14)
PO8070	15-Jul-97	Image Creation Method and Apparatus (IJ15)
PO8067	15-Jul-97	Image Creation Method and Apparatus (IJ16)
PO8001	15-Jul-97	Image Creation Method and Apparatus (IJ17)
PO8038	15-Jul-97	Image Creation Method and Apparatus (IJ18)
PO8033	15-Jul-97	Image Creation Method and Apparatus (IJ19)
PO8002	15-Jul-97	Image Creation Method and Apparatus (IJ20)
PO8068	15-Jul-97	Image Creation Method and Apparatus (IJ21)
PO8062	15-Jul-97	Image Creation Method and Apparatus (IJ22)
PO8034	15-Jul-97	Image Creation Method and Apparatus (IJ23)
PO8039	15-Jul-97	Image Creation Method and Apparatus (IJ24)
PO8041	15-Jul-97	Image Creation Method and Apparatus (IJ25)
PO8004	15-Jul-97	Image Creation Method and Apparatus (IJ26)
PO8037	15-Jul-97	Image Creation Method and Apparatus (IJ27)
PO8043	15-Jul-97	Image Creation Method and Apparatus (IJ28)
PO8042	15-Jul-97	Image Creation Method and Apparatus (IJ29)
PO8064	15-Jul-97	Image Creation Method and Apparatus (IJ30)
PO9389	23-Sep-97	Image Creation Method and Apparatus (IJ31)
PO9391	23-Sep-97	Image Creation Method and Apparatus (IJ32)



PP0888	12-Dec-97	Image Creation Method and Apparatus (IJ33)
PP0891	12-Dec-97	Image Creation Method and Apparatus (IJ34)
PP0890	12-Dec-97	Image Creation Method and Apparatus (IJ35)
PP0873	12-Dec-97	Image Creation Method and Apparatus (IJ36)
PP0993	12-Dec-97	Image Creation Method and Apparatus (IJ37)
PP0890	12-Dec-97	Image Creation Method and Apparatus (IJ38)
PP1398	19-Jan-98	An Image Creation Method and Apparatus (IJ39)
PP2592	25-Mar-98	An Image Creation Method and Apparatus (IJ40)
PP2593	25-Mar-98	Image Creation Method and Apparatus (IJ41)
PP3991	9-Jun-98	Image Creation Method and Apparatus (IJ42)
PP3987	9-Jun-98	Image Creation Method and Apparatus (IJ43)
PP3985	9-Jun-98	Image Creation Method and Apparatus (IJ44)
PP3983	9-Jun-98	Image Creation Method and Apparatus (IJ45)

#### Ink Jet Manufacturing

Further, the present application may utilize advanced semiconductor fabrication techniques in the construction of large arrays of ink jet printers. Suitable manufacturing techniques are described in the following Australian provisional patent specifications incorporated here by cross-reference:

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09/112,821

USSN	Australia n Provision al Number	Filing Date	Title Docket
09/112,822	PO7935	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM01)
09/112,825	PO7936	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM02)
09/112,826	PO7937	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM03)
09/112,827	PO8061	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM04)
09/112,828	PO8054	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM05)
	PO8065	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM06)
09/113,108	PO8055	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM07)
09/113,109	PO8053	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM08)
09/113,123	PO8078	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM09)
09/113,114	PO7933	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM10)
09/113,115	PO7950	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM11)
09/113,129	PO7949	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM12)
09/113,124	PO8060	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM13)
09/113,125	PO8059	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM14)
09/113,126	PO8073	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM15)
09/113,119	PO8076	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM16)

09/113, 120	PO8075	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM17)
09/113, 221	PO8079	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM18)
09/113, 116	PO8050	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM19)
09/113, 118	PO8052	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM20)
09/113, 117	PO7948	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM21)
09/113, 113	PO7951	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM22)
09/113, 130	PO8074	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM23)
09/113, 110	PO7941	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM24)
09/113, 112	PO8077	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM25)
09/113, 087	PO8058	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM26)
09/113, 074	PO8051	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM27)
09/113, 089	PO8045	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM28)
09/113, 088	PO7952	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM29)
09/112, 771	PO8046	15-Jul-97	A Method of Manufacture of an Image Creation Apparatus (IJM30)
	PO8503	11-Aug-97	A Method of Manufacture of an Image Creation Apparatus
09/112, 769	PO9390	23-Sep-97	A Method of Manufacture of an Image Creation Apparatus (IJM31)
09/112, 770	PO9392	23-Sep-97	A Method of Manufacture of an Image Creation Apparatus (IJM32)
09/112, 817			IJM33
09/113, 076			IJM34
09/112, 798	PP0889	12-Dec-97	A Method of Manufacture of an Image Creation Apparatus (IJM35)
09/112, 801	PP0887	12-Dec-97	A Method of Manufacture of an Image Creation Apparatus (IJM36)
09/112, 800	PP0882	12-Dec-97	A Method of Manufacture of an Image Creation Apparatus (IJM37)
09/112, 799	PP0874	12-Dec-97	A Method of Manufacture of an Image Creation Apparatus (IJM38)
09/113, 098	PP1396	19-Jan-98	A Method of Manufacture of an Image Creation Apparatus (IJM39)
09/112, 833	PP3989	9-Jun-98	A Method of Manufacture of an Image Creation Apparatus (IJM40)
09/112, 832	PP2591	25-Mar-98	A Method of Manufacture of an Image Creation Apparatus (IJM41)
09/112, 831	PP3990	9-Jun-98	A Method of Manufacture of an Image Creation Apparatus (IJM42)
09/112, 830	PP3986	9-Jun-98	A Method of Manufacture of an Image Creation Apparatus (IJM43)
09/112, 836	PP3984	9-Jun-98	A Method of Manufacture of an Image Creation Apparatus (IJM44)
09/112, 835	PP3982	9-Jun-98	A Method of Manufacture of an Image Creation Apparatus (IJM45)

### Fluid Supply

Further, the present application may utilize ink delivery system to the ink jet head. Delivery systems relating to the supply of ink to a series of ink jet nozzles are described in the following Australian provisional patent applications, the disclosure of which are hereby incorporated by cross-reference:

USSN	Australian Provisional Number	Filing Date	Title Docket
09/112,834	PO8003	15 Jul 97	Supply Method and Apparatus (F1)-Fluid01
09/113,103	PO8005	15 Jul 97	Supply Method and Apparatus (F2)-Fluid02
09/113,101	PO9404	23 Sep 97	A Device and Method (F3)-Fluid03

### MEMS Technology

Further, the present application may utilize advanced semiconductor microelectromechanical techniques in the construction of large arrays of ink jet printers. Suitable microelectromechanical techniques are described in the following Australian provisional patent applications incorporated here by cross-reference:

USSN	Australian Provisional Number	Filing Date	Title Docket
	PO7943	15 Jul 97	A device (MEMS01)
09/113,100	PO8006	15 Jul 97	A device (MEMS02)
09/113,093	PO8007	15 Jul 97	A device (MEMS03)
09/113,062	PO8008	15 Jul 97	A device (MEMS04)
09/113,064	PO8010	15 Jul 97	A device (MEMS05)
09/113,082	PO8011	15 Jul 97	A device (MEMS06)
09/113,081	PO7947	15 Jul 97	A device (MEMS07)
	PO7945	15 Jul 97	A device (MEMS08)
09/113,080	PO7944	15 Jul 97	A device (MEMS09)
09/113,079	PO7946	15 Jul 97	A device (MEMS10)
09/113,065	PO9393	15 Jul 97	A device and Method (MEMS11)
09/113,078	PP0875	15 Jul 97	A device (MEMS12)
09/113,075	PP0894	15 Jul 97	A device and Method (MEMS13)

### IR Technologies

Further, the present application may include the utilization of a disposable camera system such as those described in the following Australian provisional patent specifications incorporated here by cross-reference:

Move this to the front of the specification under the heading CROSS REFERENCES TO RELATED APPLICATIONS, after USSN 09/112,835

USSN	Australian Provisional Number	Filing Date	Title Docket
09/113, 102	PP0895	12 Dec 97	An Image Creation Method and Apparatus (IR01)
09/113, 106	PP0870	12 Dec 97	A Device and Method (IR02)
09/133, 105	PP0869	12 Dec 97	A Device and Method (IR04)
09/113, 104	PP0887	12 Dec 97	Image Creation Method and Apparatus (IR05)
09/112, 810	PP0885	12 Dec 97	An Image Production System (IR06)
09/112, 766	PP0884	12 Dec 97	Image Creation Method and Apparatus (IR10)
09/113, 085	PP0886	12 Dec 97	Image Creation Method and Apparatus (IR12)
09/113, 086	PP0871	12 Dec 97	A Device and Method (IR13)
09/113,094	PP0876	12 Dec 97	An Image Processing Method and Apparatus (IR14)
09/112, 760	PP0877	12 Dec 97	A Device and Method (IR16)
09/112, 773	PP0878	12 Dec 97	A Device and Method (IR17)
09/112, 774	PP0879	12 Dec 97	A Device and Method (IR18)
09/112, 775	PP0883	12 Dec 97	A Device and Method (IR19)
09/112, 745	PP0880	12 Dec 97	A Device and Method (IR20)
09/113, 092	PP0881	12 Dec 97	A Device and Method (IR21)

### DotCard Technologies

Further, the present application may include the utilization of a data distribution system such as that described in the following Australian provisional patent specifications incorporated here by cross-reference:

Move this to the front of the specification under the heading CROSS REFERENCES TO RELATED APPLICATIONS, after USSN 09/112,223

USSN	Australian Provisional Number	Filing Date	Title Docket
09/112,781	PP2370	16 Mar 98	Data Processing Method and Apparatus (Dot01)
09/113,052	PP2371	16 Mar 98	Data Processing Method and Apparatus (Dot02)

Artcam Technologies

Further, the present application may include the utilization of camera and data processing techniques such as an Artcam type device as described in the following Australian provisional patent specifications incorporated here by cross-reference:

Move this to the front of the specification under the heading CROSS REFERENCES TO RELATED APPLICATIONS

USSN	Australian Provisional Number	Filing Date	Title Docket
09/113,060	PO07994	15-Jul-97	Image Processing Method and Apparatus (ART01)
		11-Aug-97	Image Processing Method and Apparatus (ART01a)
09/113,070	PO8505	15-Jul-97	Image Processing Method and Apparatus (ART02)
09/113,073	PO7988	15-Jul-97	Image Processing Method and Apparatus (ART03)
09/112,748	PO9395	15-Jul-97	Image Processing Method and Apparatus (ART04)
09/112,747	PO8047	15-Jul-97	Image Processing Method and Apparatus (ART06)
09/112,776	PO8044	15-Jul-97	Image Processing Method and Apparatus (ART07)
09/112,750	PO8025	15-Jul-97	Image Processing Method and Apparatus (ART08)
09/112,746	PO8032	15-Jul-97	Image Processing Method and Apparatus (ART09)
09/112,743	PO7999	15-Jul-97	Image Processing Method and Apparatus (ART10)
09/112,742	PO7998	15-Jul-97	Image Processing Method and Apparatus (ART11)
09/112,741	PO8031	15-Jul-97	Image Processing Method and Apparatus (ART12)
09/112,740	PO8031	15-Jul-97	Media Device (ART13)
	PO8030	15-Jul-97	Image Processing Method and Apparatus (ART14)
09/112,739	PO7997	15-Jul-97	Media Device (ART15)
09/113,053	PO7979	15-Jul-97	Media Device (ART16)
09/112,738	PO8015	15-Jul-97	Media Device (ART17)
09/113,067	PO7978	15-Jul-97	Media Device (ART18)
09/113,063	PO7982	15-Jul-97	Data Processing Method and Apparatus (ART19)
09/113,069	PO7989	15-Jul-97	Data Processing Method and Apparatus (ART20)
09/112,744	PO8049	15-Jul-97	Media Processing Method and Apparatus (ART21)
09/113,058	PO7980	15-Jul-97	Image Processing Method and Apparatus (ART22)
	PO7942	15-Jul-97	Image Processing Method and Apparatus (ART23)
09/112,777	PO8048	15-Jul-97	Image Processing Method and Apparatus (ART24)
09/113,224	PO7938	15-Jul-97	Image Processing Method and Apparatus (ART25)
09/112,804	PO8046	15-Jul-97	Image Processing Method and Apparatus (ART26)
09/112,805	PO8024	15-Jul-97	Image Processing Method and Apparatus (ART27)
09/113,072	PO7940	15-Jul-97	Data Processing Method and Apparatus (ART28)
09/112,785	PO7939	15-Jul-97	Data Processing Method and Apparatus (ART29)
09/112,797	PO8501	15-Jul-97	Image Processing Method and Apparatus (ART30)
09/112,796	PO8500	15-Jul-97	Image Processing Method and Apparatus (ART31)
09/113,071	PO7987	15-Jul-97	Data Processing Method and Apparatus (ART32)
09/112,824	PO8022	15-Jul-97	Image Processing Method and Apparatus (ART33)
09/113,090			ART34
	PO8497	15-Jul-97	Image Processing Method and Apparatus (ART30)
	PO8029	15-Jul-97	Sensor Creation Method and Apparatus (ART36)
	PO7985	15-Jul-97	Image Processing Method and Apparatus (ART37)
09/112,823	PO8020	15-Jul-97	Data Processing Method and Apparatus (ART38)
09/113,222	PO8023	15-Jul-97	Data Processing Method and Apparatus (ART39)

	PO9395	15-Jul-97	Image Processing Method and Apparatus (ART4)
	PO8021	15-Jul-97	Data Processing Method and Apparatus (ART40)
09/112,786	PO8504	11-Aug-97	Image Processing Method and Apparatus (ART42)
09/113,051	PO8000	15-Jul-97	Data Processing Method and Apparatus (ART43)
09/112,782	PO7977	15-Jul-97	Data Processing Method and Apparatus (ART44)
09/113,056	PO7934	15-Jul-97	Data Processing Method and Apparatus (ART45)
09/113,059	PO7990	15-Jul-97	Data Processing Method and Apparatus (ART46)
09/113,091	PO8499	11-Aug-97	Image Processing Method and Apparatus (ART47)
09/112,753	PO8502	11-Aug-97	Image Processing Method and Apparatus (ART48)
09/113,055	PO7981	15-Jul-97	Data Processing Method and Apparatus (ART50)
09/113,057	PO7986	15-Jul-97	Data Processing Method and Apparatus (ART51)
09/113,054	PO7983	15-Jul-97	Data Processing Method and Apparatus (ART52)
09/112,752	PO8026	15-Jul-97	Image Processing Method and Apparatus (ART53)
09/112,759	PO8027	15-Jul-97	Image Processing Method and Apparatus (ART54)
09/112,757	PO8028	15-Jul-97	Image Processing Method and Apparatus (ART56)
09/112,758	PO9394	23-Sep-97	Image Processing Method and Apparatus (ART57)
09/113,107	PO9396	23-Sep-97	Data Processing Method and Apparatus (ART58)
09/112,829	PO9397	23-Sep-97	Data Processing Method and Apparatus (ART59)
09/112,792	PO9398	23-Sep-97	Data Processing Method and Apparatus (ART60)
09/112,791	PO9399	23-Sep-97	Data Processing Method and Apparatus (ART61)
09/112,790	PO9400	23-Sep-97	Data Processing Method and Apparatus (ART62)
09/112,789	PO9401	23-Sep-97	Data Processing Method and Apparatus (ART63)
09/112,788	PO9402	23-Sep-97	Data Processing Method and Apparatus (ART64)
09/112,795	PO9403	23-Sep-97	Data Processing Method and Apparatus (ART65)
09/112,749	PO9405	23-Sep-97	Data Processing Method and Apparatus (ART66)
09/112,784	PP0959	16-Dec-97	A Data Processing Method and Apparatus (ART68)
09/112,783	PP1397	19-Jan-98	A Media Device (ART69)
09/112,763			Auth02
09/112,762			Auth03
09/112,737			Auth04
09/112,761			Auth05
09/113,223			Auth06